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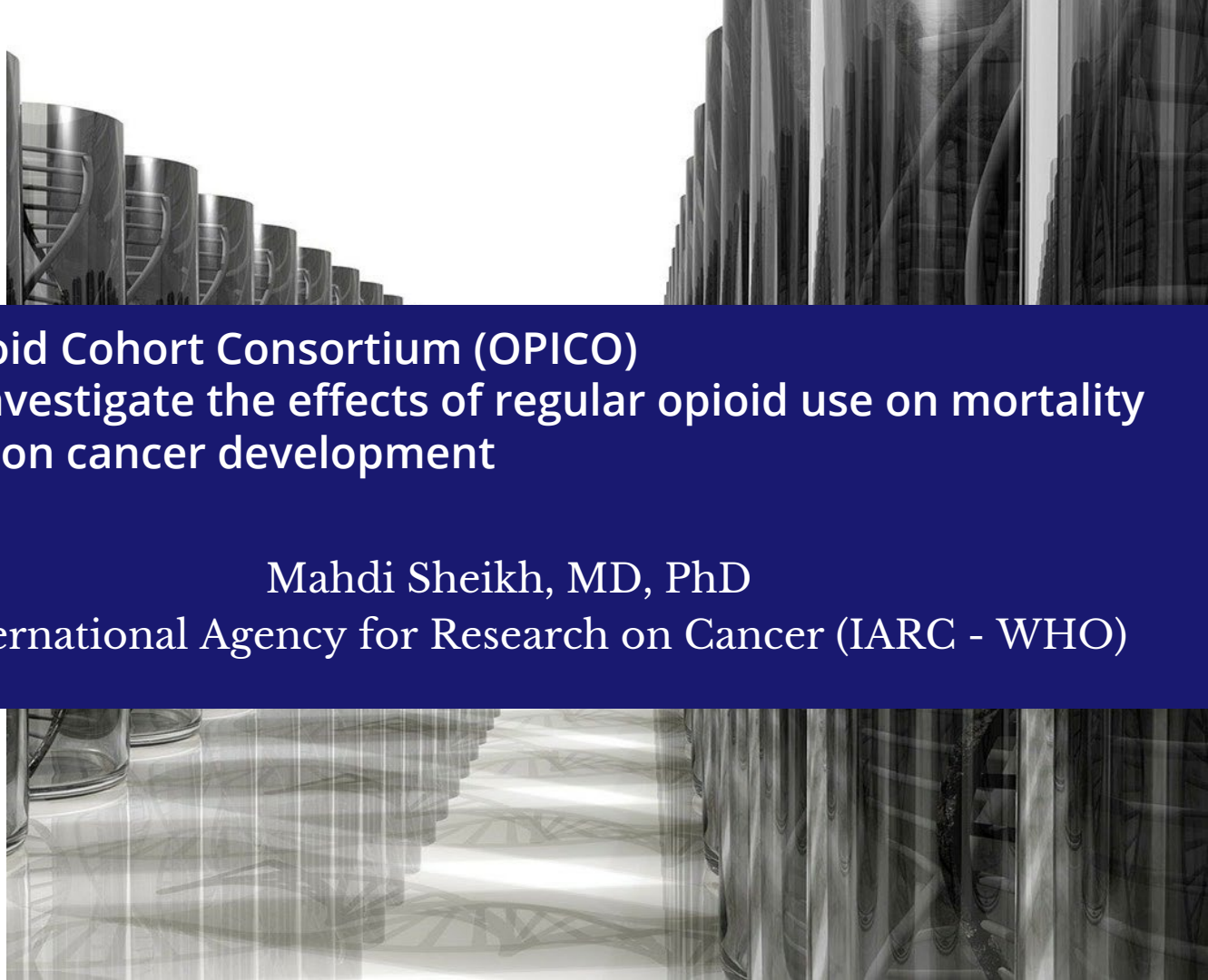

Opioid Cohort Consortium (OPICO)
to investigate the effects of regular opioid use on mortality and on cancer development

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International 100K Cohort Consortium

Outline

- Overview of the project and its aims
- Engaging LMIC cohorts
- Challenges and solutions
- What went well (wins)
- Plans for publications
- Call for participation

Global crisis of opioid use

- Thousands of deaths and billions in economic losses each year
- Long-term health consequences remain unknown

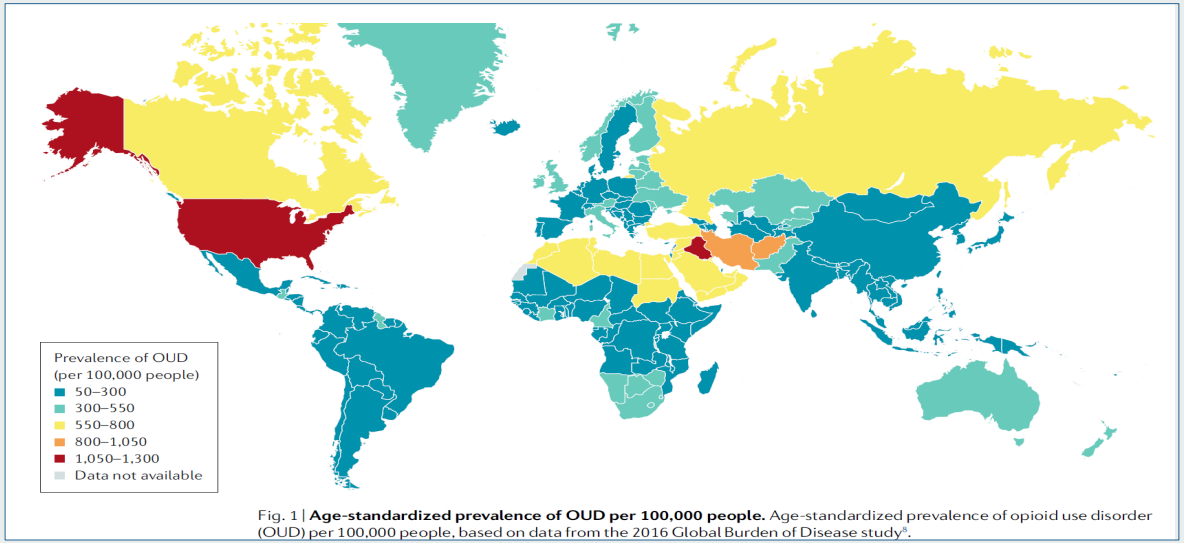


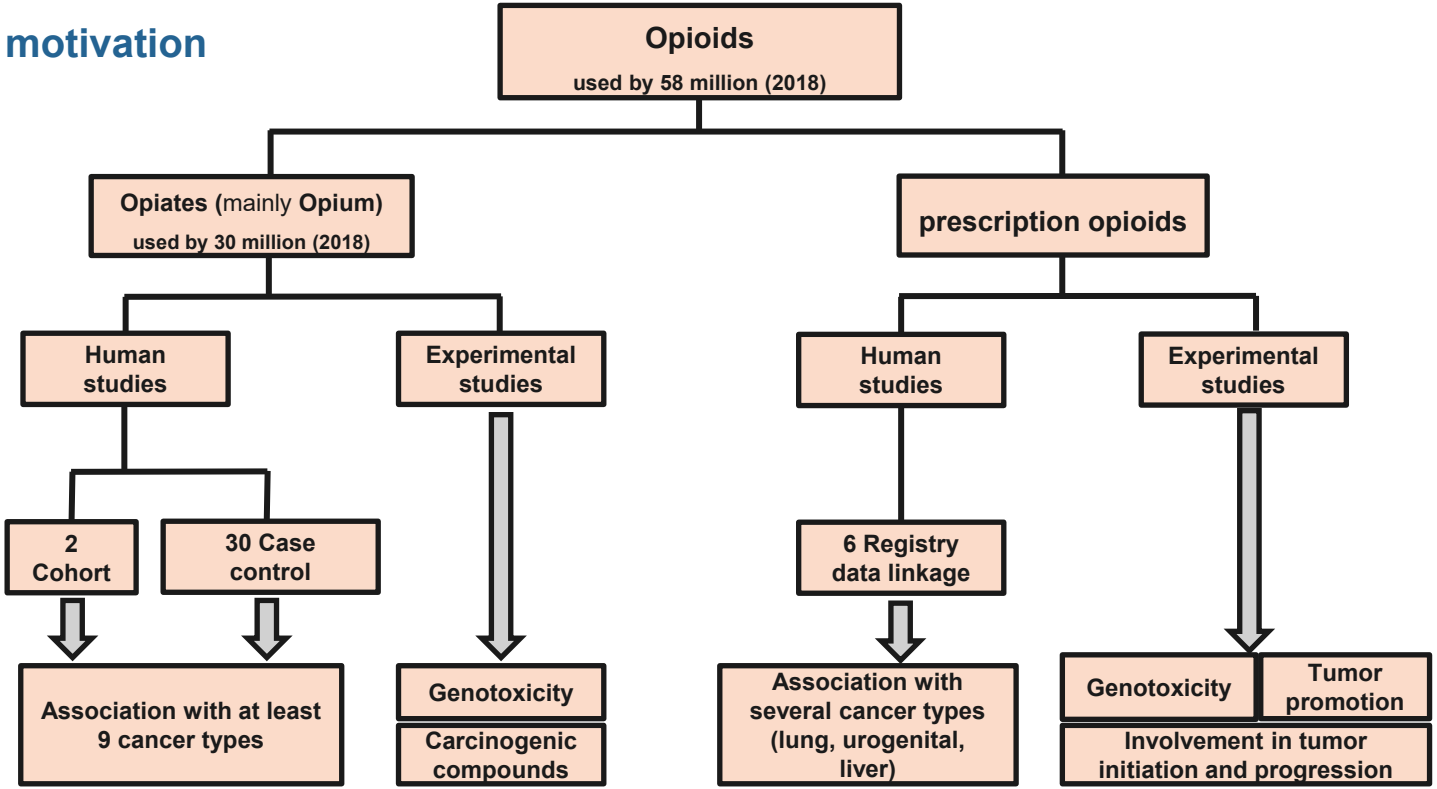
Fig. 1 | **Age-standardized prevalence of OUD per 100,000 people.** Age-standardized prevalence of opioid use disorder (OUD) per 100,000 people, based on data from the 2016 Global Burden of Disease study[6].

Opioids Definition

- **Natural opioids (opiates):** opium and its natural derivatives
- **Semi-synthetic opioids:** synthesized in labs from natural opioids
- **Synthetic opioids:** synthesized in labs using the same chemical structures of natural opioids to mimic their effects

Natural prescription opioids
Morphine, Codeine, Thebaine, Powdered Opium, Opium syrup
Semi-synthetic prescription opioids
Benzhydrocodone, Desomorphine, Diamorphine, Dihydromorphine, Dihydrocodeine, Etorphine, Ethylmorphine, Hydrocodone, Hydromorphone, Nalbuphine, Nalorphine, Nicomorphine, Oxycodone, Oxymorphone,
Synthetic prescription opioids
Alfentanil, Alphaprodine, Alphacetylmethadol, Bezitramide, Buprenorphine, Butorphanol, Carfentanil, Dezocine, Dextromoramide, Dextropropoxyphene, Dihydroetorphine, Diphenoxylate, Dipipanone, DPDPE, Eluxadoline, Fentanyl, Ketobemidone, Levacetylmethadol, Levorphanol, Lofentanil, Meptazinol, Methadone, Methadyl acetate, Normethadone, Noscapine, Oliceridine, Papaveretum, Pentazocine, Pethidine (Meperidine), Piritramide, Phenazocine, Phenoperidine, Remifentanil, Sufentanil, Tapentadol, Thebaine, Tilidine, Tramadol

Scientific motivation



Opium consumption classified by IARC Monographs into Group1 / Carcinogen to humans

Many limitations in the current evidence on opioid effects

Confounding effects and biases from linkage studies

No opioid use data in most cohorts

Limited number of opioid users in cohorts with opioid use data

Comprehensive consortium-based approach is needed

Overview of the Opioid Cohort Consortium (OPICO)

Grant support

- International Hundred K+ Cohort Consortium / Global Genomic Medicine Collaborative

Overarching aim

- To build a **strong international resource** for multidisciplinary scientific studies on the use of opioids and their long-term effects

Main exposure

- Use of prescription opioids from medication questionnaire
- Use of prescription opioids from linkage to national medication dispensing records

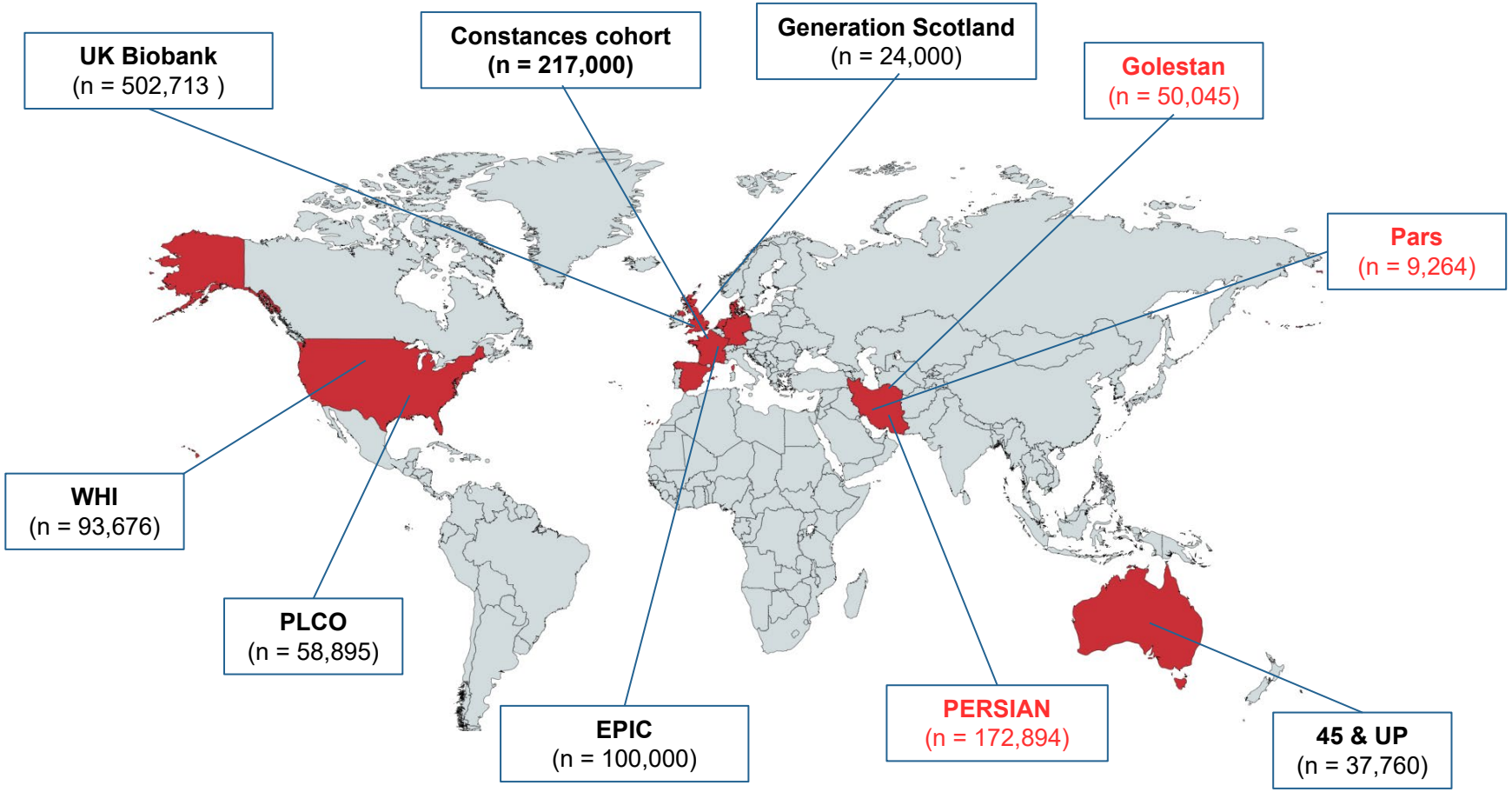
Main outcomes

- **Cancer analysis:** diagnosis of any cancer type / digestive cancers / respiratory cancers / urinary tract cancers / brain cancer
- **Mortality analysis :** death from any cause / death from circulatory diseases / respiratory diseases / digestive diseases / cancer

Aims & Approach

- Organize data on opioid use from prospective cohorts
- Compile data on opioid use in cohorts through linkage to national records
- Assess the type, distribution, and extent of opioid use across diverse populations
- Determine the association of opioid use with cancer incidence and mortality

OPICO cohorts (n=1,266,247 participants)



Cohorts with medication data participating in OPICO

Number of total participants and the subcategory of opioid users in the OPICO				
Cohort Study	**Participants (N)**	**Total opioid users N (%)**	**Medication data**	**Linkage source**
Golestan cohort	50,045	8,519 (17.0%)	Questionnaire	N/A
PERSIAN cohort	172,894	21,557 (12.4%)	Questionnaire	N/A
45 and up cohort	37,760	8,603 (22.7%)	Linkage	PBS (Australia)
UK Biobank cohort	502,713	25,864 (5.1%)	Questionnaire	N/A
Scottish Family Health Study	24,000	2,082 (8.6%)	Linkage	SPI (Scotland)
Pars cohort	9,264	818 (8.8%)	Questionnaire	N/A
PLCO Cancer Screening Trial	58,895	25,187 (42.7%)	Linkage	Medicare (USA)
Women Health Initiative (WHI)	93,676	8,430 (8.9%, estimated)	Questionnaire	N/A
EPIC (French)	100,000	4,000 (4%, estimated)	Linkage	Insurance Plan
CONSTANCES	217,000	8,680 (4%, estimated)	Linkage	CNDS (France)
Total	**1,266,247**	**113,740 (8.9%)**		

Challenges and solutions (1)

Challenge:

Defining opioid exposure and coding opioids medications

- Different names (brad & generic names)
- Different countries
- Different data sources (questionnaires & national records)
- Different coding systems

Solution:

- Working closely with local expert pharmacoepidemiologists in each country
- Using the WHO classification system (The Anatomical Therapeutic Chemical (ATC) Classification System)
- Using available online mapping resources (online WHO tool, user-defined R packages, available publications and codes from previous researches)

Challenges and solutions (2)

Challenge:

Harmonizing opioid exposure data

- Different sources: questionnaire data (lifelong medication use data) vs. Registry based data (data over a limited period)
- Different types: different type and routes of opioids

Solution:

- Defining a timeline of 12 months before recruitment as the time of exposure to opioids
- Assessing the effects of long-term use vs. short-term use
- Assessing the effects of suing strong vs. weak opioids
- Harmonizng different opioids based on the Oral Morphine Equivalent unit (OME)
- Assessing the cumulative used opioids

Challenges and solutions (3)

Challenge:

- Some included cohorts cannot send their linked data to IARC due to their national regulations for data protection and security

Solution:

- Using an additional distributed analysis model
- Analyze the data from these cohorts using the corresponding secure platform
- Perform meta-analyses using the aggregated outputs from these cohorts

Wins: feasibility of compiling opioid use data in cohorts with linkage

Collaboration with:

- Cancer Council NSW, Australia (Prof. Canfell, Dr. Weber, Dr. Sarich)
- University of NSW Sydney (Prof. Pearson)

Australian 45 and Up Study

- Recruited 267,153 adults (2006 – 2009) / General population of NSW

Linked to the Pharmaceutical Benefits Scheme (PBS)

- Australia's national drug subsidy program

Lessons learned from the feasibility study:

Identification of the:

- policy of medication dispensing / subsidy program
- pricing of opioids at the time of cohort recruitment

Reasons:

- To minimize the possible misclassifications
- To identify the inclusion and exclusion criteria

Example from the Feasibility Study:

Australia → co-payment program for prescriptions

- different thresholds for 'concessional beneficiaries' vs. 'general beneficiaries'

In 2008 (45 and up recruitment period):

- Co-payment for 'concessional beneficiaries' = $5.00
- Co-payment for 'general beneficiaries' = $31.30.
- Many opioid medications in Australia are priced $20 - $25
- These medications were not recorded in the linked national data source (PBS database) when dispensed to general beneficiaries.

- Only 37,760 participants who were concessional beneficiaries at recruitment were included

- We compiled opioid use for all included participants, of whom 8,603 (22.8%) were users of opioids

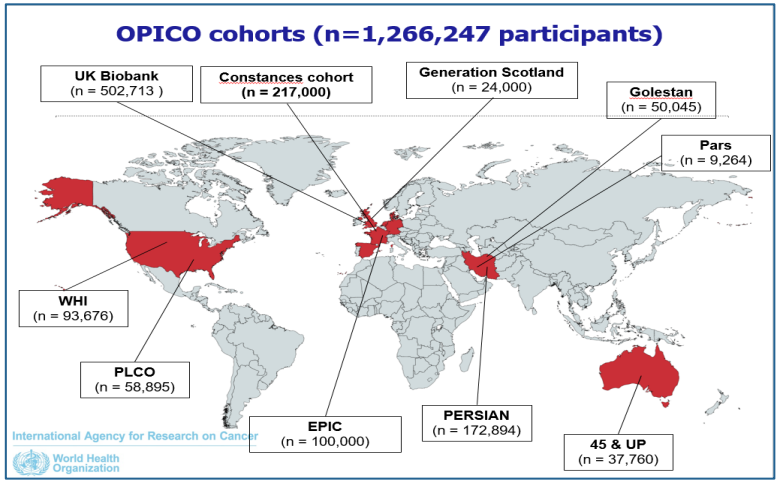
Plans for publications

- Consortium Profile
- Methodology paper on the methods of compiling opioid use data in prospective cohorts using linkage to national medication dispensing records

Required data from cohorts to participate in OPICO

- **Use of opioids**
  - questionnaires
  - data linkage to national records
- **Outcomes at follow-up**
  - vital status
  - cause of death
  - diagnosis of cancer
  - type of cancer
- **Dates or equivalent follow-up times**
- **Demographics**
  - age
  - sex
  - ethnicity
  - socioeconomic indicator
- **Smoking cigarettes**
- **Alcohol intake**
- **Chronic health conditions**
  - Diabetes
  - Hypertension
  - inflammatory conditions

Contribution to the OPICO



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